

DS1640/DS3640, DS1670/DS3670 Quad MOS TRI-SHARE™ Port Drivers
General Description

The DS1640/DS3640 and DS1670/DS3670 are quad MOS TRI-SHARE port drivers with outputs designed to drive large capacitive loads up to 500 pF associated with MOS memory systems. PNP input transistors are employed to reduce input current, allowing the large fan-out to these drivers needed in memory systems. The circuit has Schottky-clamped transistor logic for minimum propagation delay.

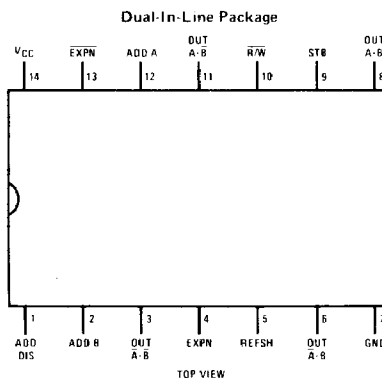
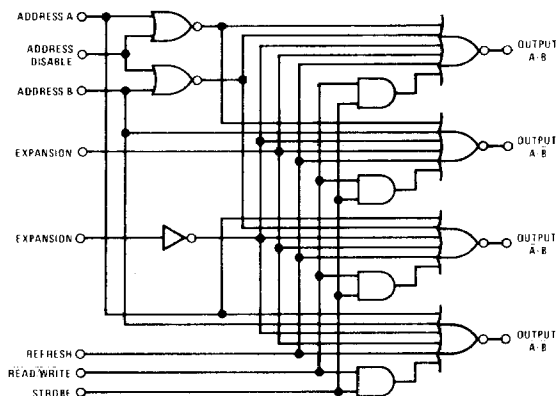
The DS1640/DS3640 has a 15 Ω resistor in series with the outputs to dampen transients caused by the fast switching output circuit. The DS1670/DS3670 has a direct, low impedance output source for use with or without an external resistor.

The DS1640/DS1670 has two address inputs which decode to one-of-four-high outputs. Provisions are made

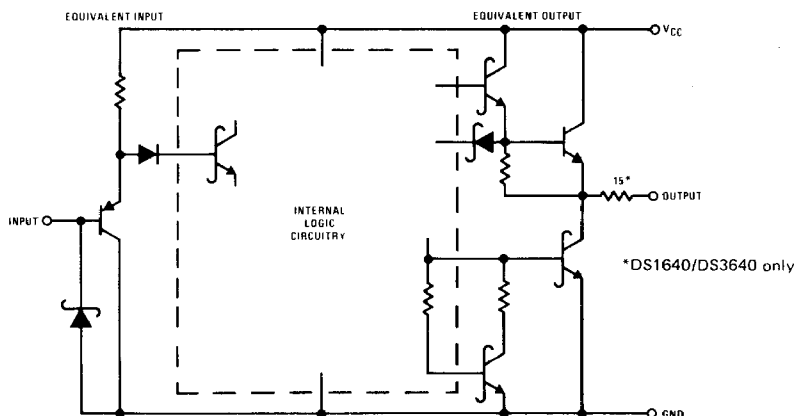
for address expansion. For example, two packages may be used to implement a three-input, eight-output decoder. Also included is a refresh control, read/write, and strobe input. These functions are required by the MM5270 4k TRI-SHARE MOS RAM.

Features

- TRI-SHARE port driver for MM5270 RAM
- TTL/DTL compatible inputs
- PNP inputs minimize loading
- Capacitance-driving outputs
- Built-in damping resistor (DS1640/DS3640)

Logic and Connection Diagrams


Order Number **DS1640J, DS3640J, DS3640N, DS1670J, DS3670J or DS3670N**.
See NS Package J14A or N14A

Schematic Diagram


Absolute Maximum Ratings (Note 1)

Supply Voltage, V_{CC}	7V
Logical "1" Input Voltage	7V
Logical "0" Input Voltage	1.5V
Storage Temperature Range	-65° C to +150° C
Power Dissipation*	
Cavity Package	1160 mW
Molded Package	1000 mW
Lead Temperature (Soldering, 10 seconds)	300° C

Operating Conditions

	MIN	MAX	UNITS
Supply Voltage (V_{CC})	4.5	5.5	V
Temperature (T_A)			
DS1640, DS1670	55	+125	°C
DS3640, DS3670	0	+70	°C

*Derate cavity package at 80° C/W above 70° C; derate molded package at 90° C/W above 70° C.

Electrical Characteristics (Notes 2 and 3)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
$V_{IN(1)}$ Logical "1" Input Voltage		2.0			V
$V_{IN(0)}$ Logical "0" Input Voltage				0.8	V
$I_{IN(1)}$ Logical "1" Input Current	$V_{CC} = 5.5V$, $V_{IN} = 5.5V$	Expansion	0.1	40	μA
		Address Disable	0.2	80	μA
		Address A, Address B	0.3	120	μA
		Refresh, Expansion, Strobe			
		Read/Write	0.4	160	μA
$I_{IN(0)}$ Logical "0" Input Current	$V_{CC} = 5.5V$, $V_{IN} = 0.5V$	Expansion	50	-250	μA
		Address Disable	-100	500	μA
		Address A, Address B	-150	-750	μA
		Refresh, Expansion, Strobe			
		Read/Write	-0.2	-1.0	mA
V_{CLAMP} Input Clamp Voltage	$V_{CC} = 4.5V$, $I_{IN} = -18 mA$		-0.75	-1.2	V
V_{OH} Logical "1" Output Voltage (No Load)	$V_{CC} = 4.5V$, $I_{OH} = -10 \mu A$	DS1640, DS1670	3.4	4.3	V
		DS3640, DS3670	3.5	4.3	V
V_{OL} Logical "0" Output Voltage (No Load)	$V_{CC} = 4.5V$, $I_{OL} = 10 \mu A$	DS1640, DS1670	0.25	0.40	V
		DS3640, DS3670	0.25	0.35	V
V_{OH} Logical "1" Output Voltage (With Load)	$V_{CC} = 4.5V$, $I_{OH} = -1.0 mA$	DS1640	2.4	3.5	V
		DS1670	2.5	3.5	V
		DS3640	2.6	3.5	V
		DS3670	2.7	3.5	V
V_{OL} Logical "0" Output Voltage (With Load)	$V_{CC} = 4.5V$, $I_{OL} = 20 mA$	DS1640	0.6	1.1	V
		DS1670	0.4	0.5	V
		DS3640	0.6	1.0	V
		DS3670	0.4	0.5	V
I_{ID} Logical "1" Drive Current	$V_{CC} = 4.5V$, $V_{OUT} = 0V$, (Note 4)		-250		mA
I_{OD} Logical "1" Drive Current	$V_{CC} = 4.5V$, $V_{OUT} = 4.5V$, (Note 4)		150		mA
I_{CC-LOW} Power Supply Current	$V_{CC} = 5.5V$	All Inputs = 0V	60	85	mA
$I_{CC-HIGH}$ Power Supply Current		Dis = R/W = EXPN = 4.5V All Others = 0.0V	45	75	mA

Switching Characteristics ($V_{CC} = 5V$, $T_A = 25^\circ C$) (Note 4)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
t_{S+} Storage Delay Negative Edge Address Inputs, Expan	(Figure 1)	$C_L = 50 pF$	10	14	nS
		$C_L = 250 pF$	15	20	nS
t_{S-+} Storage Delay Positive Edge Address Inputs, Expan	(Figure 1)	$C_L = 50 pF$	10	14	nS
		$C_L = 250 pF$	15	20	nS
t_{S+-} Storage Delay Negative Edge Ref, Read/Write, Strobe, Expan	(Figure 1)	$C_L = 50 pF$	7	11	nS
		$C_L = 250 pF$	11	15	nS
t_{S-+} Storage Delay Positive Edge Ref, Read/Write, Strobe, Expan	(Figure 1)	$C_L = 50 pF$	8	12	nS
		$C_L = 250 pF$	12	16	nS
t_F Fall Time	(Figure 1)	$C_L = 50 pF$	6	9	nS
		$C_L = 250 pF$	15	25	nS
t_R Rise Time	(Figure 1)	$C_L = 50 pF$	8	11	nS
		$C_L = 250 pF$	25	35	nS

Notes

Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. Except for "Operating Temperature Range" they are not meant to imply that the devices should be operated at these limits. The table of "Electrical Characteristics" provides conditions for actual device operation.

Note 2: Unless otherwise specified min/max limits apply across the -55°C to $+125^{\circ}\text{C}$ temperature range for the DS1640 and DS1670 and across the 0°C to $+70^{\circ}\text{C}$ range for the DS3640 and DS3670. All typical values are for $T_A = 25^{\circ}\text{C}$ and $V_{CC} = 5\text{V}$.

Note 3: All currents into device pins shown as positive, out of device pins as negative, all voltages referenced to ground unless otherwise noted. All values shown as max or min on absolute value basis.

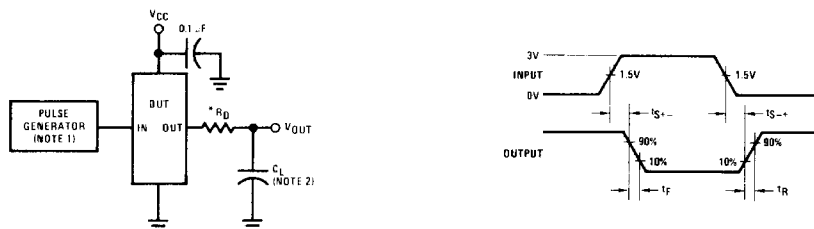
Note 4: When measuring output drive current and switching response for the DS1670 and DS3670 a $15\ \Omega$ resistor should be placed in series with each output. This resistor is internal to the DS1640/DS3640, and need not be added.

Truth Table

ADD A	ADD B	ADD DSBL	EXPAN	$\overline{\text{EXPAN}}$	RFSH	$\overline{\text{R/W}}$	STB	OUT $\overline{\text{A}} \cdot \overline{\text{B}}$	OUT $\overline{\text{A}} \cdot \text{B}$	OUT $\text{A} \cdot \overline{\text{B}}$	OUT $\text{A} \cdot \text{B}$
0	0	0	0	1	0	*	*	1	0	0	0
0	1	0	0	1	0	*	*	0	1	0	0
1	0	0	0	1	0	*	*	0	0	1	0
1	1	0	0	1	0	*	*	0	0	0	1
0	0	1	0	1	0	*	*	1	1	1	1
X	X	X	1	X	X	X	X	0	0	0	0
X	X	X	X	0	X	X	X	0	0	0	0
X	X	X	X	X	1	X	X	0	0	0	0
X	X	X	X	X	X	1	1	0	0	0	0

X = Don't Care; * = read/write and strobe not both high at same time.

AC Test Circuit and Switching Time Waveforms



*Internal on DS1640 and DS3640

Note 1: The pulse generator has the following characteristics: $Z_{OUT} = 50\ \Omega$ and $PRR \leq 1\text{ MHz}$. Rise and fall times between 10% and 90% points $\leq 5\text{ ns}$.

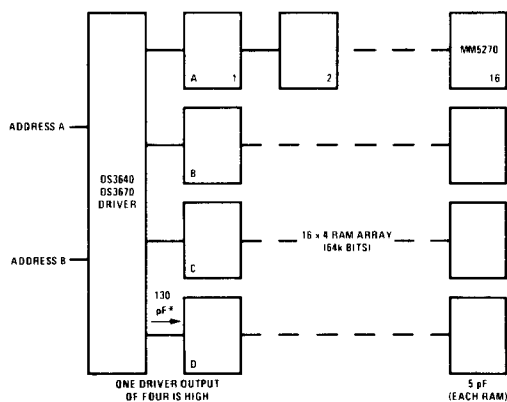
Note 2: C_L includes probe and jig capacitance.

FIGURE 1

Typical Application

The DS3640/DS3670 driver is intended for use in driving the TRI-SHARE port of the MM5270 4k MOS

RAM. Its address inputs facilitate decoding, and its direct controls simplify the refresh cycle.



*50 pF for wiring capacitance included